

Stomatopoda (Crustacea) from the Marquesas Islands: results of MUSORSTOM 9

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ABSTRACT

The Stomatopoda of the Marquesas Archipelago are reported, based principally on the collections of MUSORSTOM 9. Prior to this study, 10 species of stomatopod were known from the Marquesas. Fourteen species are reported of which nine are new records for the Marquesas, and seven are new records for French Polynesia. Nineteen species of stomatopod are now known from the Marquesas. Additionally, 37 species of stomatopod are now known from French Polynesia. Several records represent important range extensions and the most important is that of *Neoanchisquilla tuberculata* Ahyong, 1998, previously known only from the western Indian Ocean. Moreover, the present series of *N. tuberculata* includes late pelagic larvae through to adults. Two new species are described: *Gonodactyloideus tricarinatus* n. sp., and *Acanthosquilla crosnieri* n. sp. *G. tricarinatus* n. sp. is the second species in the genus to be described and differs from its congener in having three instead of five mid-dorsal carinae on the telson. *Acanthosquilla crosnieri* n. sp. differs from its congeners in having two fixed spines adjacent to the articulation of the uropodal endopod. A checklist of the stomatopods known from French Polynesia is provided.

KEY WORDS

Crustacea,
Stomatopoda,
Marquesas Islands,
Pacific Ocean,
new species.

RÉSUMÉ

Crustacés stomatopodes des îles Marquises : résultats de MUSORSTOM 9.

Les stomatopodes de l'archipel des Marquises sont étudiés principalement d'après les collections de MUSORTSOM 9. Avant cette étude 10 espèces de stomatopodes étaient connues des îles Marquises. Quatorze espèces sont mentionnées dont neuf sont nouvelles pour les Marquises, et sept pour la Polynésie française. Dix-neuf espèces de stomatopodes sont maintenant connues des îles Marquises et 37 de Polynésie française. L'aire géographique de plusieurs espèces est étendue de façon importante notamment pour *Neoanchisquila tuberculata* Ahyong, 1998, connu auparavant seulement de l'océan Indien occidental. De plus, les spécimens actuellement connus de *N. tuberculata* vont des larves pélagiques aux adultes. Deux nouvelles espèces sont décrites : *Gonodactyloideus tricarinatus* n. sp. et *Acanthosquila crosnieri* n. sp. *G. tricarinatus* n. sp. est la deuxième espèce du genre à être décrite et diffère de son congénère par la présence de trois carènes dorso-médianes sur le telson au lieu de cinq. *Acanthosquila crosnieri* n. sp. diffère de ses congénères par la présence de deux épines fixes à côté de l'articulation de l'endopodite de l'uropode. Une liste des stomatopodes connus de Polynésie française est fournie.

MOTS CLÉS

Crustacea,
Stomatopoda,
îles Marquises,
océan Pacifique,
nouvelles espèces.

INTRODUCTION

The Marquesas Archipelago comprises a group of nine major islands and is located approximately 1300 km northeast of Tahiti, Society Islands. The stomatopod fauna of the Marquesas has never been the focus of any major study. Previous records of stomatopods from the area are based on miscellaneous collections in association with other Crustacea reported in the literature. On the basis of published records, Poupin (1998) provided an annotated checklist of decapod and stomatopod Crustacea from French Polynesia whereby 10 stomatopod species were recorded from the Marquesas. The present report is the first major account of the stomatopods of the Marquesas and is based on collections made by the RV *Alis* under the auspices of MUSORSTOM 9, supplemented by additional material from other institutions. Fourteen species are reported below, of which nine are new records for the Marquesas, including two new species. An updated checklist of the stomatopods from French Polynesia is provided.

MATERIALS AND METHODS

Terminology and size descriptors follow Ahyong (2001). All measurements are in millimetres. Total length (tl) is measured along the midline from the tip of the rostrum to the apices of the submedian teeth. Carapace length (cl) is measured along the midline and excludes the rostral plate. Corneal index (CI) is given as 100cl divided by cornea width. Relative lengths of the uropodal exopod segments are given as p/d where p is the dorsal length of the proximal segment, and d is the dorsal length of the distal segment. Propodal index (PI) is given as 100cl divided by propodus length. Abdominal-width carapace length index (AWCLI) equals 100 times the abdominal width at the sixth somite divided by the cl. Other abbreviations used in this account include: antennule (A1); antenna (A2); abdominal somite (AS); thoracic somite (TS); maxilliped (MXP); median (MD); submedian (SM); intermediate (IM); lateral (LT); marginal (MG). Specimens are deposited in the collections of the Australian Museum, Sydney (AM), Muséum national d'Histoire naturelle, Paris (MNHN), University Museum of Zoology,

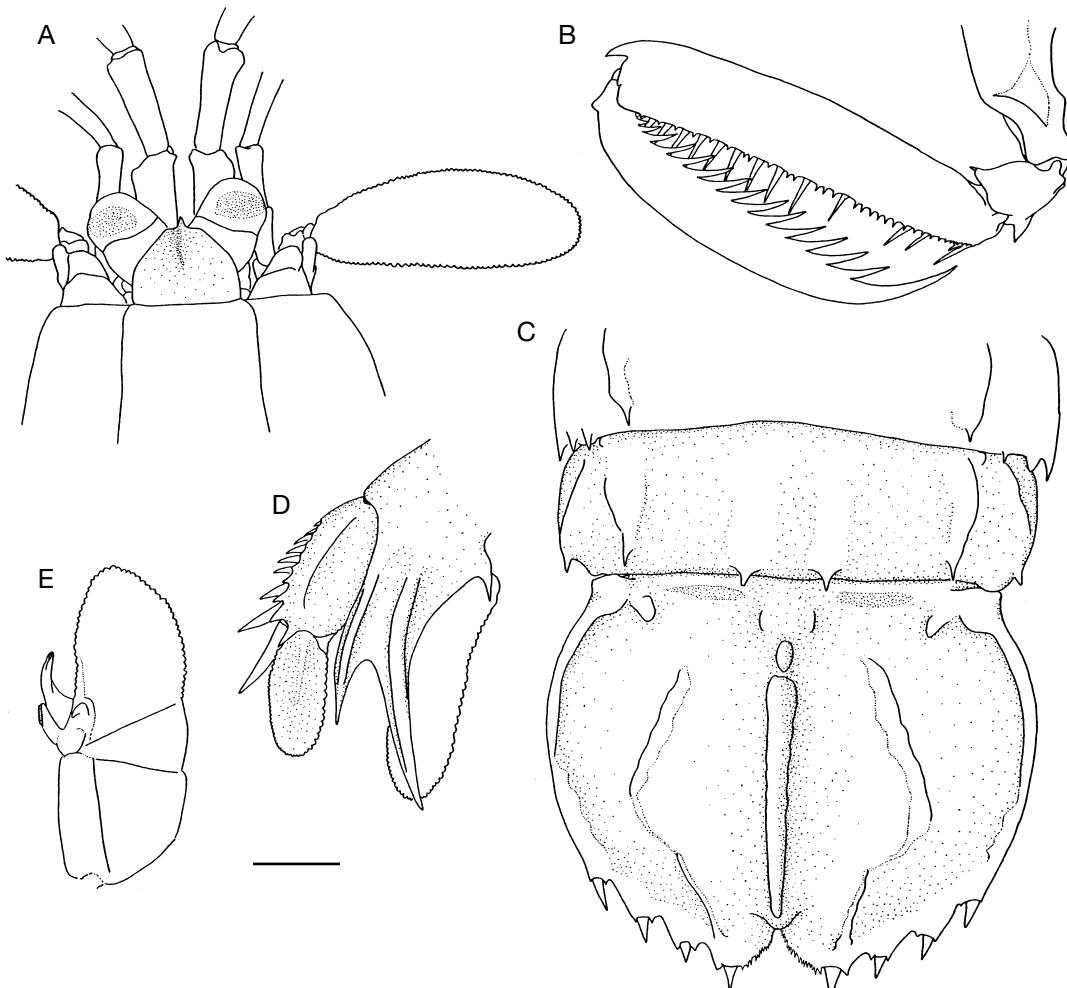


FIG. 1. — *Bathysquilla microps* (Manning, 1961), ♂ tl 49 mm (stn CP1272); **A**, anterior cephalon, dorsal; **B**, raptorial claw, right lateral; **C**, AS5-6 and telson, dorsal; **D**, uropod, right ventral; **E**, pleopod 1 endopod, right anterior. Scale bar: 2 mm.

Cambridge, England (MZC), the Natural History Museum, London (NHM) and National Museum of Natural History, Smithsonian Institution, Washington D. C. (USNM).

SYSTEMATICS

Superfamily BATHYSQUILLOIDEA Manning, 1967
Family BATHYSQUILLIDAE Manning, 1967
Genus *Bathysquilla* Manning, 1963

Bathysquilla microps (Manning, 1961) (Fig. 1)

Lysiosquilla microps Manning, 1961: 693-696, fig. 5, pls 10, 11. Type locality: SE of Tortugas, Florida Straits, 24°11.0'N, 83°21.5'E.

MATERIAL EXAMINED. — Eiao, stn CP1272, 7°55'S, 140°44'E, 660-680 m, 04.IX.1997, 1 ♂ tl 49 (MNHN).

MEASUREMENTS. — Male (n = 1) tl 49.

DISTRIBUTION. — Western Atlantic and the Indo-West Pacific from the Philippines, Marianas, Australia, Hawaii and now the Marquesas.

REMARKS

The specimen is a juvenile male bearing relatively large, spherical eyes and a deeply sulcate rostral plate (Fig. 1A), the modified endopod of pleopod 1 is not fully developed (lacking the posterior endite) (Fig. 1E), and the abdominal somites bear fewer spines along the posterior margins. The large eyes and deeply sulcate rostral plate present in juvenile *B. microps* are characters retained by adults of *B. crassispinosa* (Fukuda, 1911). The specimen otherwise agrees well with adult *B. microps* including a single dorsal spine on the carpus of the raptorial claw (Fig. 1B), the absence of a ventral spine on the uropodal protopod anterior to the exopodal articulation (Fig. 1D), and divergent submedian carinae on the dorsal surface of the telson (Fig. 1C).

Superfamily GONODACTYLOIDEA Giesbrecht, 1910

Family GONODACTYLIDAE Giesbrecht, 1910

Genus *Gonodactylellus* Manning, 1995

Gonodactylellus espinosus (Borradaile, 1898)
(Fig. 2)

Gonodactylellus espinosus Borradaile, 1898: 35, fig. 5a-b, pl. 5. Type locality: Rotuma, Fiji Islands. — Manning 1967a: 21-23, fig. 8.

Gonodactylellus espinosus — Poupin 1998: 33.

MATERIAL EXAMINED. — **Fiji Islands.** Rotuma, J. S. Gardiner coll., holotype ♂ tl 18 (MZC 15.09.1897).

Marquesas Islands. Ua Huka, stn 19, Hane Bay, 8°55.65'S, 139°32.4'W, encrusted coral, algae, rubble, 0-3 m, IX-X.1997, 1 ♂ broken cl 4.3, 4 ♀♀ tl 12-27 (MNHN). — Nuku Hiva, Anaho Bay, 5 m, from *Pocillopora* coral, 22.VIII.1976, B. Goldman coll., 1 ♀ tl 29 (AM P56987).

MEASUREMENTS. — Male (n = 2) cl 18, female (n = 5) tl 12-29.

DISTRIBUTION. — Cocos-Keeling Islands to French Polynesia including the Tuamotu Archipelago, Society Islands and now the Marquesas.

REMARKS

Much of the original coloration appears to be retained in the present series: overall colour is dark olive green with paler mottling and dark margins on the abdominal and thoracic somites; eyestalks are pinkish brown proximally; rostral

plate bears a dark-red transverse bar at articulation with carapace; raptorial claw with meral spot white (possibly faded); dactylus reddish purple; submedian carinae of AS6 and mid-dorsal carinae of telson with reddish brown mottling.

Gonodactylellus micronesicus (Manning, 1971)
(Fig. 3)

Gonodactylus micronesica Manning, 1971a: 77-79, fig. 2, tab. 1. Type locality: W of Parry (Elmer) Island, Enewetak Atoll, 11°24'05"S, 162°19'05"E.

Gonodactylellus micronesicus — Manning 1995: 56.

MATERIAL EXAMINED. — W of Parry (Elmer) Island, Enewetak Atoll, 11°24'05"S, 162°19'05"E, 24-35 m, coral pinnacle, 25.IX.1969, T. Waller coll., holotype ♀ tl 18 (USNM 135628). — Ua Pou, stn DW1143, 9°20.9'S, 140°02.7'W, 18-55 m, 22.VIII.1997, 1 ♂ tl 15, 3 ♀♀ tl 11-15, 1 ♀ postlarva tl 9 (MNHN). — Hiva Oa, stn CP1203, 9°52.7'S, 139°02.2'W, 60-61 m, 28.VIII.1997, 1 ♂ tl 12. — Stn DW1204, 9°52.6'S, 139°03.2'W, 60-62 m, 28.VIII.1997, 3 ♂♂ tl 13-18 (MNHN). — Ua Huka, stn 34, B. Haava, P. Temoni, I. Teauua coll., sand, coral, calcareous algae, 10-15 m, X.1997, 1 ♀ tl 16. — Stn 34, B. Haava, P. Temoni, I. Teauua coll., sand, coral, calcareous algae, 10-15 m, X.1997, 5 ♂♂ tl 15-21, 5 ♀♀ tl 12-21 (MNHN).

MEASUREMENTS. — Male (n = 10) tl 12-21, female (n = 10) tl 11-21, female postlarva (n = 1) tl 9.

DISTRIBUTION. — Australia, Enewetak and now the Marquesas.

REMARKS

The present specimens agree largely with the holotype of *G. micronesicus* but vary in the size of the posterior projection on the median carina of the telson. As in material reported by Ahyong (2001), the size and orientation of the posterior spine on the median carina of the telson in the present specimens vary allometrically. The smallest specimens bear a distinct, posteriorly directed spine that is reduced to a small upturned tubercle in larger specimens (Fig. 3E, J). The type description is incorrect in attributing a strong posterior spine to the median carina of the telson. Rather, the holotype bears a short blunt posterior protuberance on the median carina of the telson.

The ocular scales in *G. micronesicus* are well-developed even in the tl 9 postlarva (Fig. 3A, G,

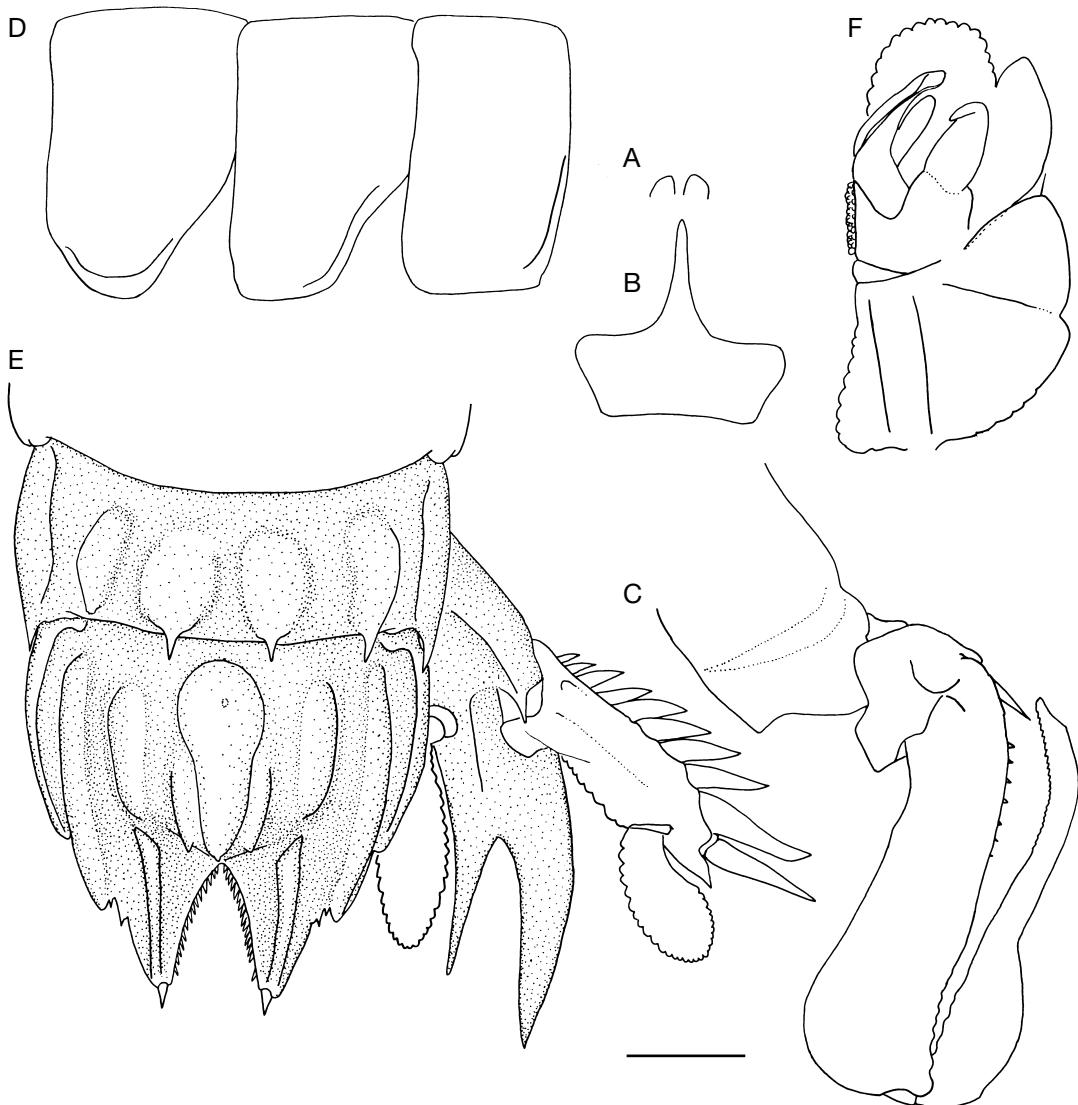


FIG. 2. — *Gonodactylellus espinosus* (Borradaile, 1898); A-E, ♀ tl 27 mm (Ua Huka); A, ocular scales, dorsal; B, rostral plate, dorsal; C, raptorial claw, right lateral; D, TS6-8, right lateral; E, AS5-6, telson and uropod, dorsal; F, ♂ cl 4.3 mm (Ua Huka), pleopod 1 endopod, right anterior. Scale bar: A-E, 1 mm; F, 0.5 mm.

K) and in all males examined (tl 12-21), the penes and modified endopod of pleopod 1 (Fig. 3F) are well-developed suggesting that this species matures by tl 12. As with many other gonodactylids, the carinae of the telson are considerably more inflated in adult males than in females. *Gonodactylellus micronesicus* closely resembles *G. rubriguttatus* Erdmann & Manning,

1998, but aside from colour pattern, differs in bearing separate instead of fused ocular scales, and the median carina of the telson is much more strongly inflated in males.

The colour pattern of the present specimens is remarkably well-preserved and agrees well with the account of Reaka & Manning (1987a): the meral spot on the raptorial claw is white, the

dactylus and distal propodus of the claw are red as are the carinae of AS6 and the telson. The white coloration of the meral spot in these specimens is unlikely to be an artefact of preservation because other red markings on the claw are well preserved including a red crescent above and below the meral spot.

Genus *Gonodactyloideus* Manning, 1984

Gonodactyloideus tricarinatus n. sp. (Fig. 4)

HOLOTYPE. — Eiao, stn CP1285, $7^{\circ}52.7'S$, $140^{\circ}36.4'E$, 91 m, 07.IX.1997, ♀ tl 24 (MNHN).

ETYMOLOGY. — Named *tricarinatus* for the three mid-dorsal carina on the telson.

DIAGNOSIS. — Ocular scales broader than high, flattened, separate. Rostral plate with acute anterolateral angles; lateral margins strongly divergent anteriorly; median spine longer than base. Telson with three unarmed mid-dorsal carinae in addition to carinae of primary teeth; carina of intermediate tooth not extending anteriorly beyond posterior quarter of marginal carina.

MEASUREMENTS. — Female holotype tl 24, cl 5.2, A2 scale 2.4, A1 peduncle 3.4, AS5 width 3.9.

DISTRIBUTION. — Known only from the type locality.

DESCRIPTION

Cornea expanded laterally, flattened dorsally, broader than stalk, extending anteriorly to end of antennal peduncle segment 2. Ophthalmic somite anterior margin with median spinule. Ocular scales relatively narrow, but broader than high, flattened, separate.

A1 peduncle 0.66cl. A1 somite dorsal processes low, truncate, with low truncate lobe at A1 peduncle articulation. A2 protopod without papillae; with fixed laterally flattened dorsal projection and anteriorly directed ventral spine. A2 scale 0.47cl. Rostral plate slightly broader than long; anterolateral angles acute; lateral margins strongly divergent anteriorly; apical spine longer than base.

Raptorial claw propodus with long movable proximal spine; opposable margin sparsely pectinate proximally.

Mandibular palp 3-segmented. MXP1-5 each with epipod.

TS6-7 with truncate lateral margins; margin of TS6 slightly broader than TS7. TS8 lateral margin obtusely rounded; sternal keel obsolete.

AS1-5 unarmed posterolaterally. AS6 with armed SM, IM and LT carinae; without ventrolateral spine anterior to uropodal articulation margin. AWCLI 748.

Telson as long as broad, with three pairs of primary teeth; with 20 SM denticles either side of midline; with three unarmed mid-dorsal carinae in addition to carinae of primary teeth; MD carina with proximal pit, apex blunt, unarmed posteriorly; accessory MD carinae obsolete, forming short "anchor"; carina of IM tooth not extending anteriorly beyond posterior quarter of MG carina; ventral surface smooth, without carinae or tubercles.

Uropodal exopod distal segment outer margin with 10 or 11 movable spines and fixed distal spine; endopod with dorsal carina laterally, entire margin with single row of setae.

Colour in alcohol

Almost completely faded. Eye stalks with longitudinal pale green stripes, flanked by dark chromatophores. Carapace and antennular somite with scattered chromatophores, most concentrated anteriorly. Rostral plate with pink apex and pair of orangish marks basally, extending onto anterior margin of carapace. Raptorial claw with dactylus and upper margin of meral depression pink. Thoracic and abdominal somites with sparsely scattered chromatophores dorsally.

REMARKS

Gonodactyloideus tricarinatus n. sp. differs from the only other species in the genus, *G. cracens* (Manning, 1984), in bearing sharper anterolateral angles on the rostral plate, the ocular scales are slightly broader and there are only three mid-dorsal carinae on the telson, of which none are posteriorly armed. The number of mid-dorsal carinae on the telson is diagnostic for several gonodactylid genera (Manning 1995), but in this case variation in the number of carinae resembles variation between some species of *Gonodactylellus*, such as *Gonodactylellus erdmanni* and

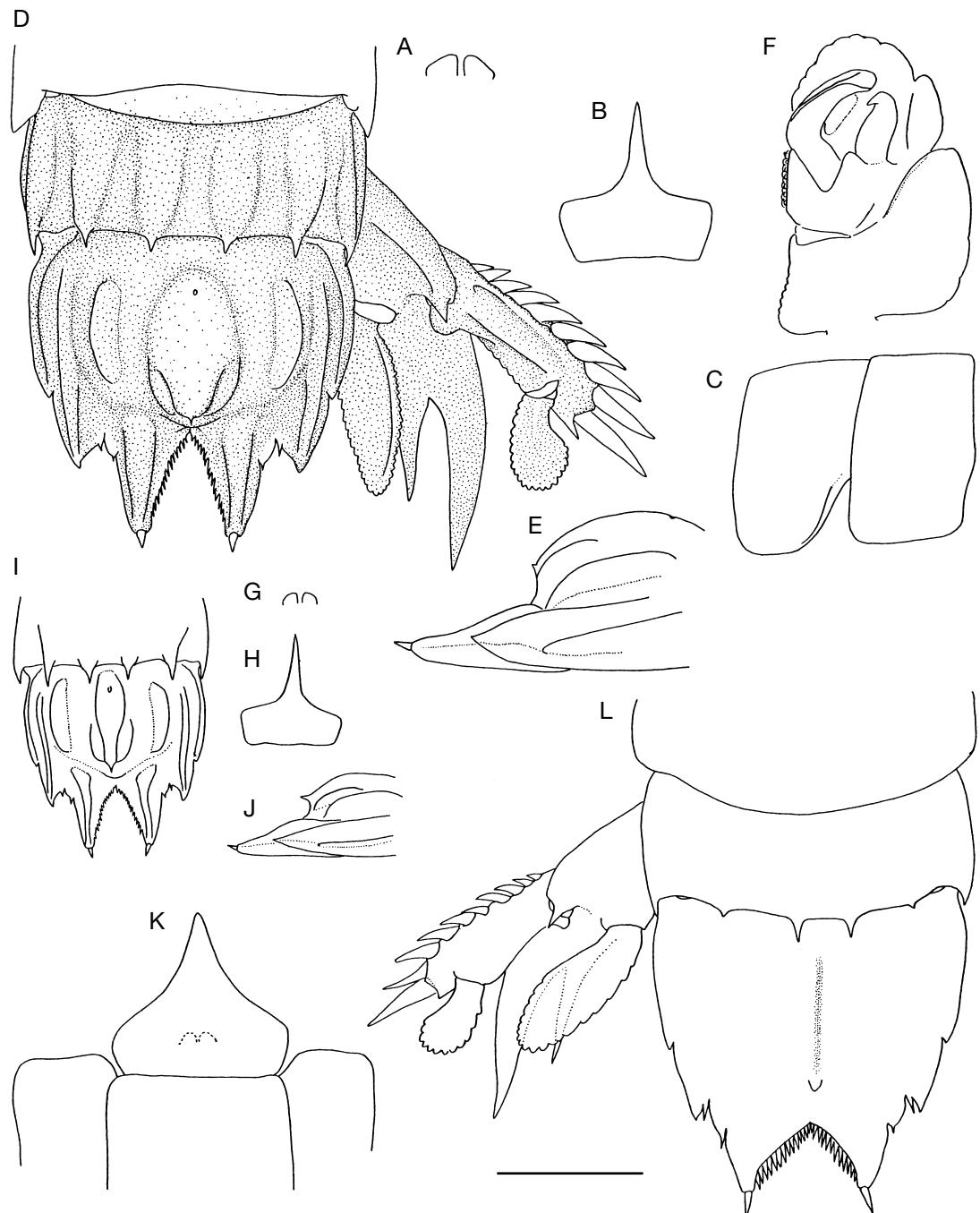


FIG. 3. — *Gonodactyluss micronesicus* (Manning, 1971); A-F, ♂ tl 18 mm (stn 34); A, ocular scales, dorsal; B, rostral plate, dorsal; C, TS6-7, right lateral; D, AS5-6, telson and uropod, dorsal; E, telson, right lateral; F, pleopod 1 endopod, right anterior; G-J, ♀ tl 11 mm (stn DW1143); G, ocular scales; H, rostral plate, dorsal; I, AS6 and telson, dorsal; J, telson, right lateral; K, L, ♀ postlarva tl 9 mm (stn DW1143); K, rostral plate and anterior carapace, dorsal; L, AS5-6, telson and uropod, dorsal. Scale bar: A-E, G-J, 1 mm; F, K, L, 0.5 mm.

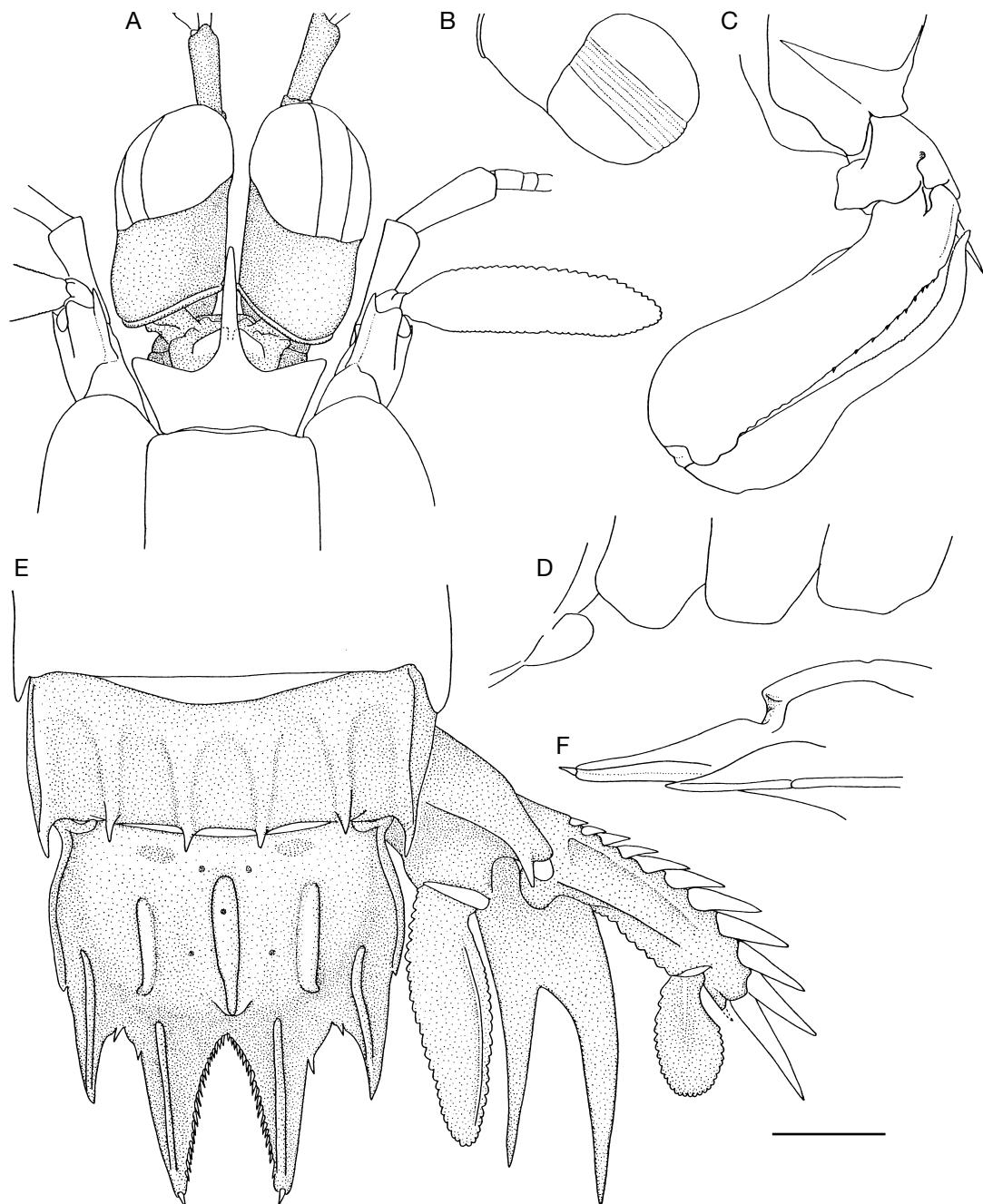


FIG. 4. — *Gonodactyoideus tricarinatus* n. sp., ♀ tl 24 mm (holotype); **A**, anterior cephalon, dorsal; **B**, eye, right dorsal; **C**, raptorial claw, right lateral; **D**, TS5-8, AS1, lower right lateral; **E**, AS5-6, telson and uropod, dorsal; **F**, telson, right lateral. Scale bar: 1 mm.

Gonodactylellus affinis. In *Gonodactylellus affinis*, the anterior submedian carinae are relatively long and all five mid-dorsal carinae are usually armed (as in *G. cracens*), whereas in *Gonodactylellus erdmanni*, the anterior submedian carinae are short or obsolete and the median carina is usually unarmed posteriorly (as in *Gonodactyloideus tricarinatus* n. sp.).

Of the currently recognized gonodactylid genera, *Gonodactyloideus* most closely resembles *Gonodactylellus* in the relatively narrow ocular scales, general telson shape and absence of lobes between the terminal spines of the uropodal protopod. Unlike most gonodactylids that occupy the intertidal and shallow sublittoral zones, both species of *Gonodactyloideus* occur in relatively deep water: 80-107 m for *G. cracens* (Manning 1984; Moosa 1986) and 91 m for *G. tricarinatus*.

Family ODONTODACTYLIDAE Manning, 1980 Genus *Odontodactylus* Bigelow, 1893

Odontodactylus brevirostris (Miers, 1884) (Fig. 5)

Gonodactylus brevirostris Miers, 1884: 567, pl. 52c (*Gonodactylus elegans* in figure legend). Type locality: Providence Island, Seychelles.

Odontodactylus brevirostris — Manning 1967b: 22-29, fig. 7 (part). — Michel 1970a: 113-122, 124, 125, figs 1, 3, 4, 7, 8, tab. 1 ("26 mm" larva). — Poupin 1998: 34.

MATERIAL EXAMINED. — **Seychelles**. Providence Island, *Alert*, holotype ♂ tl 23 (NHM 82.27).

Marquesas. Nuku Hiva, stn DW1170, 8°45.1'S, 140°13.1'W, 104-109 m, 25.VIII.1997, 1 ♂ postlarva tl 25, 2 ♀ ♀ tl 26 (MNHN). — Stn CP1177, 8°45.1'S, 140°15.1'W, 108-112 m, 25.VIII.1997, 1 ♀ postlarva tl 25 (MNHN). — Stn DR1183, 8°45.5'S, 140°03.8'W, 86-120 m, 26.VIII.1997, 1 ♀ tl 30. — Hiva Oa, stn DW1203, 9°52.7'S, 139°02.2'W, 60-61 m, 28.VIII.1997, 1 ♀ tl 52 mm (MNHN). — Stn DW1204, 9°52.6'S, 139°03.2'W, 60-62 m, 28.VIII.1997, 1 ♂ postlarva tl 25 (MNHN). — Stn DW1217, 9°44.5'S, 138°49.9'W, 85-87 m, 30.VIII.1997, 1 ♀ postlarva tl 23 (MNHN). — Stn DW1230, 9°43.6'S, 139°06.6'W, 95-100 m, 31.VIII.1997, 2 ♂ ♂ tl 24-26 (MNHN). — Stn CP1237, 9°41.9'S, 139°03.6'W, 95-305 m, 31.VIII.1997, 1 ♀ postlarva tl 24

(MNHN). — Ua Huka, stn DR1297, 8°54.2'S, 139°37.4'W, 90-150 m, 08.IX.1997, 1 ♀ postlarva tl 24 (MNHN). — Fatu Hiva, 10°29'00"S, 138°40'15"W, 49 m, 29.I.1991, J. Poupin coll., 1 ♂ tl 30. — Between Society Islands and Marquesas, RV *Alis*, pelagic trawl, 1997, A. Danigo coll., 1 ♂ late pelagic larva tl 39, 1 ♀ late pelagic larva tl > 26, rostral spine broken (MNHN).

MEASUREMENTS. — Male (n = 3) tl 24-30, female (n = 2) tl 30-52, male postlarvae (n = 3) tl 23-25, female postlarvae (n = 4) tl 23-25, male late pelagic larva (n = 1) tl 39, female late pelagic larva (n = 1) tl > 26.

DISTRIBUTION. — Widely distributed in the tropical Indo-Pacific, from the western Indian Ocean to Hawaii and now the Marquesas.

REMARKS

As indicated by Ahyong (2001), *Odontodactylus brevirostris* sensu Manning (1967b) comprises a complex of at least four species. Manning (1967b) reported two postlarval groups ("small" and "large") and Michel (1970a) reported two corresponding larval series ("16 mm" and "26 mm"), both as *O. brevirostris*. The present specimens all correspond to the "large" late-larval and post-larval groups, and are referable to *O. brevirostris* sensu stricto. Other species in the "*O. brevirostris*" complex all have "small" late-larvae and post-larvae (Ahyong 2001).

In the present specimens, the number of teeth on the raptorial claw varies from eight to 10, the number of movable spines on the outer margin of the uropodal exopod 9-11, with the distal most extending beyond the midlength to slightly beyond the apex of the distal segment of the exopod.

Family PSEUDOSQUILLIDAE Manning, 1977 Genus *Pseudosquilla* Dana, 1852

Pseudosquilla ciliata (Fabricius, 1787)

Squilla ciliata Fabricius, 1787: 333. Type locality: Exmouth Gulf, Western Australia, restricted by neotype selection (Ahyong 2001).

Pseudosquilla ciliata — Edmondson 1921: 288-290. — Poupin 1998: 35.

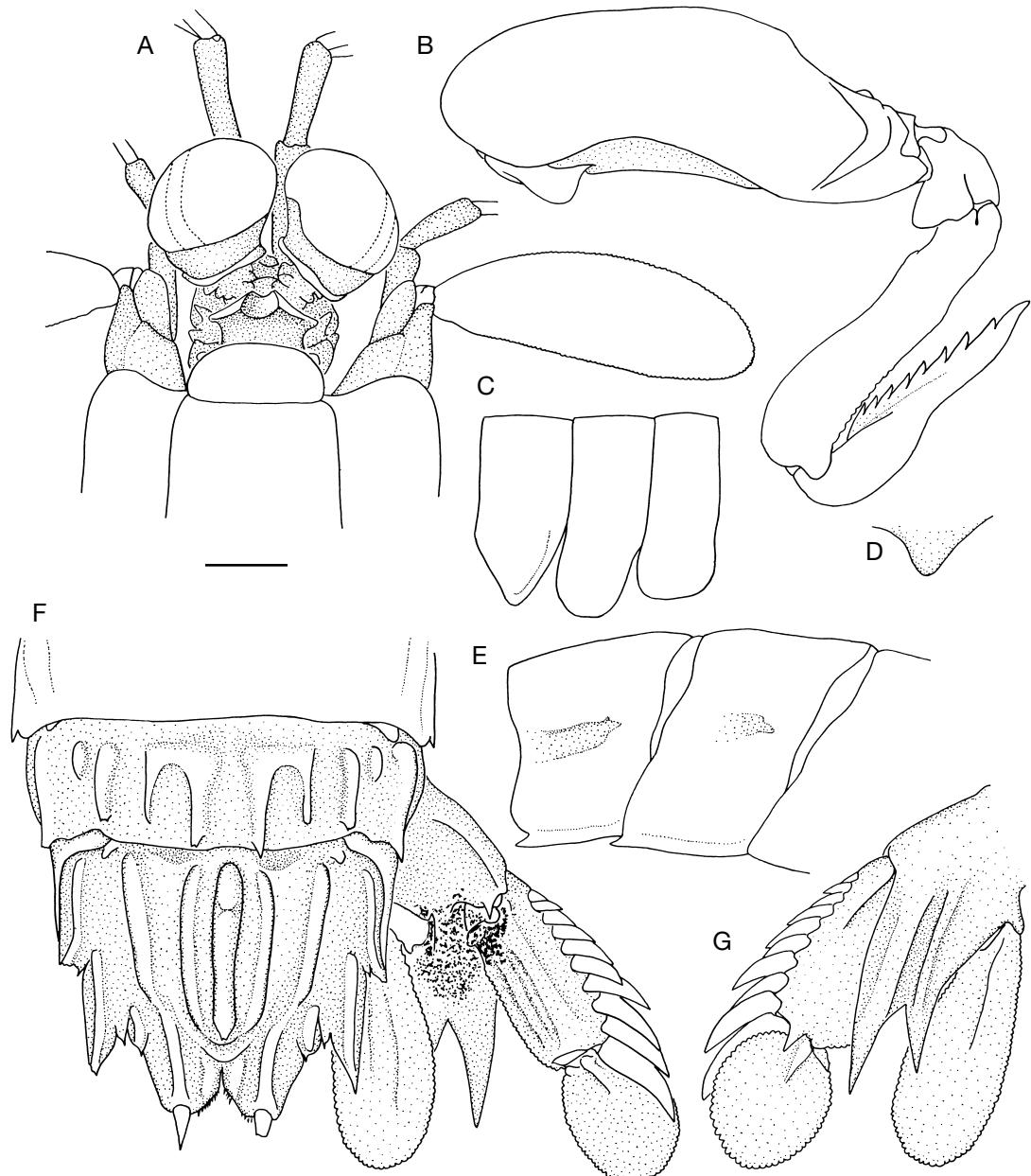


FIG. 5. — *Odontodactylus brevirostris* (Miers, 1884), ♀ tl 52 mm (stn DW1203); A, anterior cephalon, dorsal; B, raptorial claw, right lateral; C, TS6-8, right lateral; D, TS8 sternal keel; E, AS3-5, right lateral; F, AS5-6, telson and uropod, dorsal; G, uropod, right ventral. Scale bar: A-C, E-G, 2 mm; D, 1 mm.

MATERIAL EXAMINED. — Marquesas. Nuku Hiva, stn DW1186, 8°48.1'S, 140°03.5'W, 42-45 m, 26.VIII.1997, 1 ♀ postlarva tl 23 (MNHN). — Stn CP1187, 8°49.2'S, 140°03.5'W, 25-30 m,

26.VIII.1997, 1 ♀ tl 34. — Hiva Oa, stn DW1204, 9°52.6'S, 139°03.2'W, 60-62 m, 28.VIII.1997, 1 ♀ tl 26 (MNHN). — Stn DW 1213, 9°50.3'S, 140°03.2'W, 18-20 m, 29.VIII.1997, 1 ♂ tl 33 (MNHN).

MEASUREMENTS. — Male (n = 1) tl 33, female (n = 2) tl 34, female postlarva (n = 1) tl 23.

DISTRIBUTION. — Indo-West Pacific, eastern and western Atlantic. Edmondson (1921) reported *P. ciliata* from the Marquesas.

Genus *Raoulserenea* Manning, 1995

Raoulserenea komaii (Moosa, 1991) (Fig. 6)

Pseudosquilla komaii Moosa, 1991: 171-173, fig. 4.
Type locality: Chesterfield Islands, New Caledonia.

Raoulserenea komaii — Manning 1995: 116.

MATERIAL EXAMINED. — **New Caledonia.** Chesterfield Islands, 19°03.00'S, 158°53.93'E, 8 m, hard coral substrate, VII-VIII.1988, holotype ♀ tl 54 (MNHN St 1411).

Marquesas. Ua Pou, stn CP1264, 9°21.3'S, 140°07.7'W, 53-57 m, 03.IX.1997, 1 ♂ postlarva tl 30, 1 ♀ postlarva tl 29 (MNHN). — Between Society Islands and Marquesas, RV *Alis*, pelagic trawl, 1997, A. Danigo coll., 1 ♂ postlarva tl 33 (MNHN).

Tahiti. Society Islands, RV *Alis*, 5-10 m, 1997, 1 ♀ postlarva tl 28 (MNHN).

MEASUREMENTS. — Male (n = 1) tl 54, male postlarva (n = 2) tl 30-33, female postlarva (n = 2) tl 28-29.

DISTRIBUTION. — The Cocos Keeling Islands, New Caledonia, Ogasawara Islands and now the Marquesas.

REMARKS

The colour pattern of the present specimens generally agrees well with holotype of *R. komaii*. The paired dark "eye spots" on the carapace, however, are surrounded by irregular white patches, most of which unite to form a continuous white ring. In one specimen (Fig. 6A), the pattern of white patches approaches Borradaile's (1898) figure for *R. oxyrhyncha* (Borradaile, 1898), whereas in another from the same locality (CP1264, female postlarva), the pattern of white patches is less irregular but most unite to form a near continuous white ring, closely resembling the holotype of *R. komaii* from New Caledonia. In the present specimens, as in the holotype of *R. komaii*, the general body colour pattern is darkly mottled with transverse rows of pale diffuse spots on each

thoracic and abdominal somite, TS6 and 8 bear a dark patch at the base of each pereiopod and TS7 bears at most a faint trace of pigment at the base of the pereiopods.

The postlarvae of *R. komaii* closely resemble those of *Pseudosquilla oculata* (based on accounts in Bigelow [1931] and Manning [1977]) and are difficult to distinguish. Aside from colour pattern, the present specimens differ from accounts of post-larval *P. oculata* in bearing posterolateral spines on AS4-5 instead of AS5 only, and the margins of the rostral plate are slightly concave, rather than convex as figured by Manning (1977) for *P. oculata* from the eastern Atlantic. The large size of postlarval *R. komaii* suggests that this species settles at a considerably larger size than do *R. ornata* (Miers, 1880), *R. hieroglyphica* (Manning, 1972) and *P. ciliata* (Bigelow 1931; Manning 1972, 1977) in which postlarvae are reported at less than tl 25.

Superfamily LYSIOSQUILLOIDEA Giesbrecht, 1910

Family LYSIOSQUILLIDAE Giesbrecht, 1910

Genus *Lysiosquillina* Manning, 1995

Lysiosquillina maculata (Fabricius, 1793)

Squilla maculata Fabricius, 1793: 511. Type locality: Indonesia.

Lysiosquilla maculata — Manning 1978a: 3-7, figs 1-3, 9.

Lysiosquilla sp. 2 — Michel 1970b: 57, 58, fig. 2D, F, fig. 3A, B, tab. 1.

Lysiosquillina maculata — Poupin 1998: 36, fig. 7.

MATERIAL EXAMINED. — Eiao, stn CP1158, 7°58.7'S, 140°43.9'E, 109-110 m, 23.VIII.1997, 1 late pelagic larva, tl 30. — Stn CP1159, 7°50.3'S, 140°43.7'E, 145 m, 23.VIII.1997, 1 late pelagic larva, tl 33 (MNHN). — Nuku Hiva, stn DW1279, 7°59.4'S, 140°42.2'E, 23-70 m, 06.IX.1997, 1 ♂ juvenile tl 29 (MNHN), 1 ♂ tl 210 (USNM 6593).

DISTRIBUTION. — Widely distributed in the Indo-West Pacific from the western Indian Ocean to the central Pacific. Manning (1978a) previously reported *L. maculata* from the Marquesas.

MEASUREMENTS. — Male (n = 2) tl 29-210, late pelagic larvae (n = 2) tl 30-33.

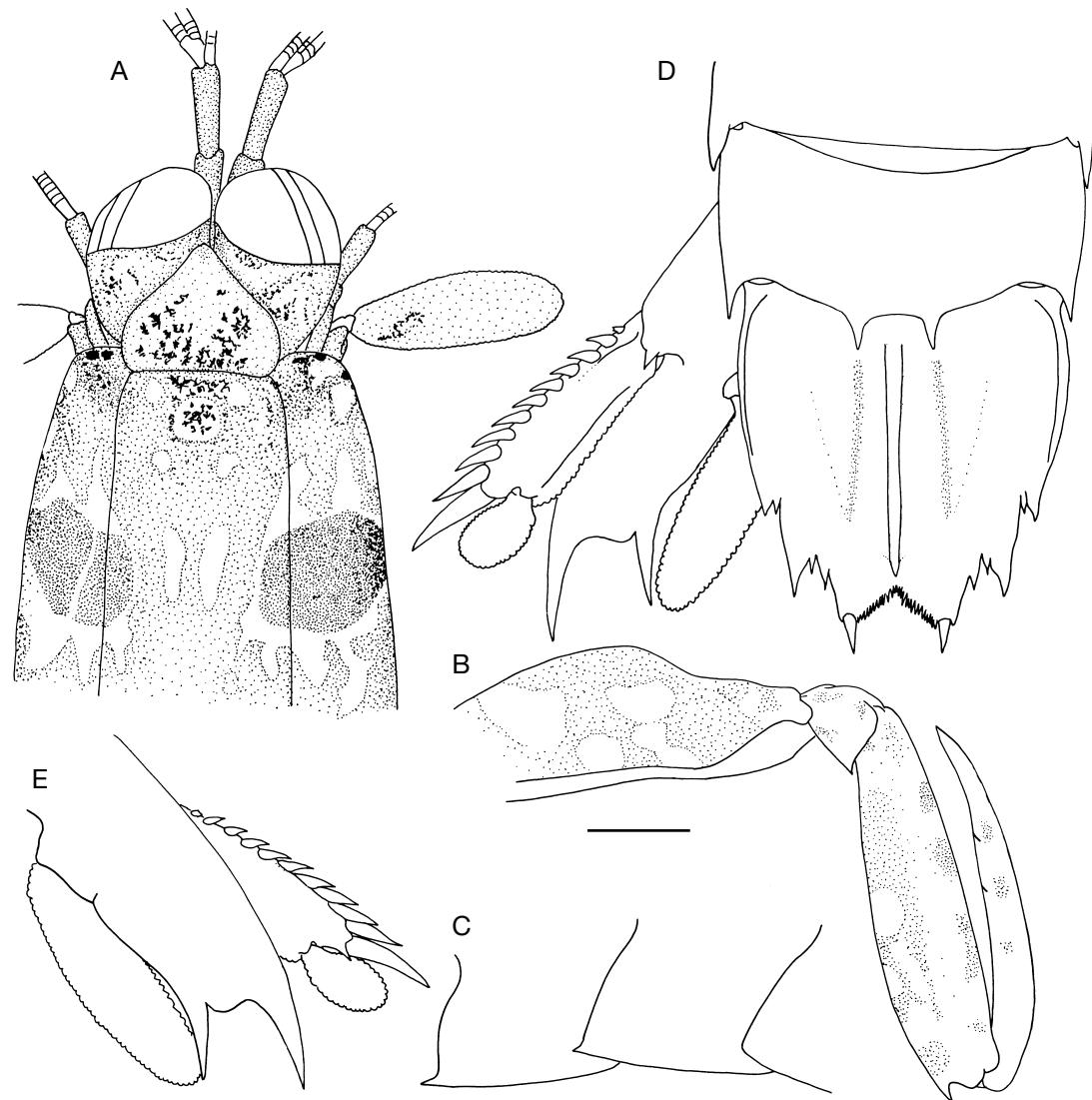


FIG. 6. — *Raoulserenea komaii* (Moosa, 1991), ♂ postlarva tl 30 mm (stn CP1264); A, anterior cephalon, dorsal; B, raptorial claw, right lateral; C, AS3-5, lower right lateral; D, AS5-6, telson and uropod, dorsal; E, uropod, left ventral. Scale bar: 1.25 mm.

REMARKS

The male juvenile agrees well with adults in most characters including broad antennal scales, nine or 10 teeth on the dactylus of the raptorial claw, a blunt sternal keel on TS8, a carinate rostral plate and colour pattern, including the dark apex on the uropodal endopod. The juvenile differs from adults in that the dorsal processes on the anten-

nular somite are directed anterolaterally (as in adult *Lysiosquilla sulcirostris* Kemp, 1911) instead of anteriorly and the mandibular palp is 1-in instead of 3-segmented. The late pelagic larva agrees well with the account and figures of larvae attributed to *L. maculata* by Michel (1970b). *Lysiosquillina sulcata* also occurs in French Polynesia (Steger & Benis-Steger 1988), and it is

possible that in postlarvae and juveniles, the morphology of the rostral plate, diagnostic for *L. sulcata*, could resemble juvenile *L. maculata*; *L. maculata* differs, however, in bearing a dark instead of light apex on the uropodal endopod.

Family NANNOSQUILLIDAE Manning, 1980
Genus *Acanthosquilla* Manning, 1963

Acanthosquilla crosnieri n. sp.
(Fig. 7)

TYPE MATERIAL. — Holotype: Hiva Oa, stn DW1213, 9°50.3'S, 140°03.2'W, 18-20 m, 29.VIII.1997, ♂ tl 33 (MNHN); paratype: Ua Huka, Hane Bay, stn 29, 8°55.70'S, 139°32.00'W, fine and coarse sand, 7-11 m, X.1997, 1 ♀ broken cl 6.0 (MNHN).

OTHER MATERIAL. — Fatu Hiva, 27.5 m, F. E. Lewis coll., 2 badly fragmented specimens (USNM 125045).

DIAGNOSIS. — Outer margin of dactylus of raptorial claw with distal lobe triangular, distinctly larger than proximal lobe. AS6 posterior margin unarmed, with posterolateral spines only. Telson with two pairs of slender, fixed primary teeth; with SM denticles forming inverted V-shaped row; with four spiniform IM denticles in same plane; dorsal surface with five well spaced posteriorly directed spines in fan shaped row above marginal armature. Uropod protopod inner margin with two slender ventral spines adjacent to endopod articulation.

MEASUREMENTS. — Male (n = 1) tl 33, female (n = 1) cl 6. Other measurements of holotype: cl 5.5, A1 peduncle 2.5, A2 scale 1.9.

ETYMOLOGY. — Named for Alain Crosnier who keenly encouraged the study of this material.

DISTRIBUTION. — Known only from the Marquesas.

DESCRIPTION

Eye with cornea slightly flattened anteriorly, inclined laterally on stalk, stalk elongate, extending almost to end of antennular peduncle segment 3. Ophthalmic somite anterior margin rounded. Ocular scales narrow, separate, inclined anteriorly.

A1 peduncle 0.45-0.46cl. A2 protopod with one ventral papilla; A2 scale 0.36-0.41cl.

Rostral plate longer than broad, subpentagonal with short apical spine; lateral margins convergent; dorsal and ventral surfaces smooth.

Raptorial claw dactylus with five teeth; penultimate tooth shorter than preceding tooth, outer margin broadly curved, proximal margin with basal notch, distal lobe triangular, distinctly larger than proximal lobe. PI 128 (male), 133 (female).

Mandibular palp 3-segmented. MXP1-5 each with epipod.

TS6-7 with lateral margins truncate, rounded anterolaterally and posterolaterally. TS8 rounded; sternal keel obsolete.

Endopod of first pleopod in male with elongate tube process and short, blunt hook process.

AS6 posterior margin smooth; posterolateral spine long, slender; with slender ventrolateral spine and short blunt angular lobe anterior to uropodal articulation; sternum posterior margin unarmed.

Telson with two pairs of slender, fixed primary teeth; with three or four SM denticles either side of midline forming inverted V-shaped row; with four spiniform IM denticles in same plane, first, second and fourth subequal in length, third usually longest; with one spiniform LT denticle; dorsal surface with pair of mid-dorsal pits and five well spaced posteriorly directed spines in fan shaped row above marginal armature.

Uropodal protopod inner margin with two slender ventral spines adjacent to endopod articulation; exopod proximal segment outer margin with six movable spines, distalmost exceeding midlength of distal segment; distal margin with short ventral spine; exopod distal segment dark on outer half only; endopod with median dorsal carina.

Colour in alcohol

Anterior cephalon darkly mottled. Raptorial claw and pereiopods with dark mottling. Anterior half of carapace with dark mottled, transverse band, with narrow pale transverse band and posterior quarter with dark transverse band; posterior margin darkest. Thoracic and abdominal somites pale on anterior quarter, with mottled transverse band and dark posterior margin, widest medially. Telson dark with pale median line and anteromedial area. Uropodal protopod with dark margins and ter-

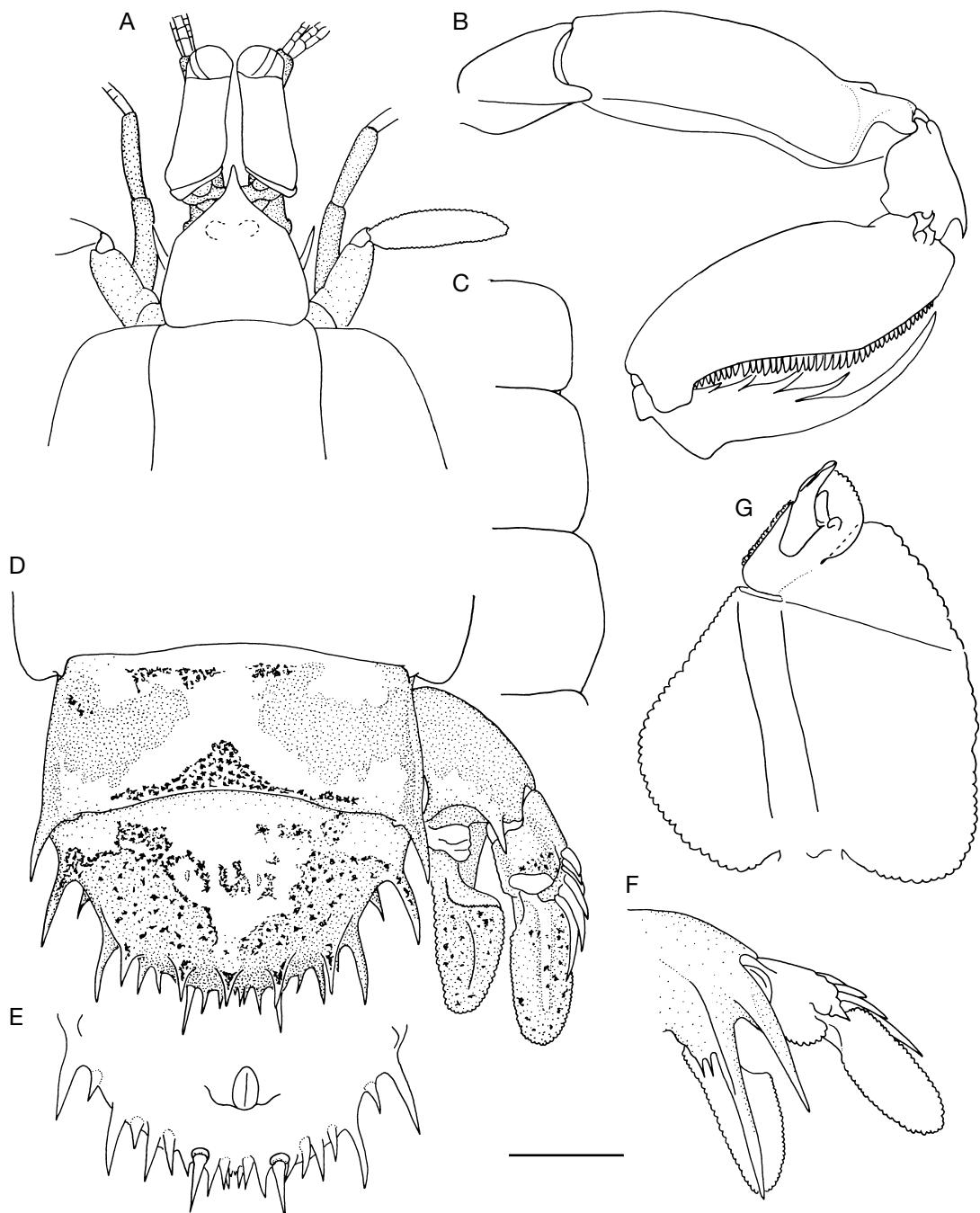


FIG. 7. — *Acanthosquilla crosnieri* n. sp., ♂ tl 33 mm (holotype); A, anterior cephalon, dorsal; B, raptorial claw, right lateral; C, TS6-8, right dorsal; D, AS5-6, telson and uropod, dorsal; E, telson, ventral; F, uropod, left ventral; G, pleopod 1 endopod, right anterior. Scale bar: A-F, 2 mm; G, 1 mm.

minal spines. Uropodal exopod proximal segment and movable lateral spines dark; distal segment dark on outer half only; endopod dark.

REMARKS

Acanthosquilla crosnieri n. sp. closely resembles *A. multifasciata* from the Indo-West Pacific in almost all respects, but differs in bearing slightly narrower corneae, in bearing a pair of spines under the articulation of the uropodal endopod. The most significant differentiating character is the pair of spines under the endopodal articulation, for the other morphological characters are more difficult to use without comparative material. The two specimens in the USNM are badly fragmented but clearly referable to *A. crosnieri* n. sp.; in both specimens, the telson and uropods are intact.

Family TETRASQUILLIDAE Manning & Camp, 1993
Genus *Heterosquilloides* Manning, 1966

Heterosquilloides insignis (Kemp, 1911)

Lysiosquilla insignis Kemp, 1911: 94; 1913: 126, pl. 9, figs 99-102. Type locality: off North Andaman Island, 14°27'N, 93°50'E.

Heterosquilloides insignis — Moosa, 1986: 386, pl. 1, fig. c.

Heterosquilla (Heterosquilloides) insolita — Manning 1969: 58, 60 (Galapagos specimen only; non *H. insolita* [Manning, 1963]).

Heterosquilla (Heterosquilloides) zarenkovi Makarov, 1978: 179, fig. 2.

MATERIAL EXAMINED. — Ua Pou, stn DR1150, 9°18'S, 140°05'W, 450-480 m, 22.VIII.1997, 1 ♂ broken, cl 5.7 (MNHN).

MEASUREMENTS. — Male (n = 1) cl 5.7.

DISTRIBUTION. — Widely distributed in the Indo-Pacific, from the western Indian Ocean, from South Africa to Australia, the Philippines, Vietnam, the Galapagos Islands and now from the Marquesas.

REMARKS

The present specimen agrees well with published accounts (Kemp 1911, 1913; Manning 1991; Moosa 1991; Ahyong 2001) and represents the

first record of the species from the Marquesas. The raptorial claws bear seven teeth and AS4-5 bear a posterolateral spine. Manning (1969) reported a fragmented specimen from the Galapagos Islands tentatively identified as *H. insolita* (Manning, 1963), but as indicated by Ahyong (2001), the specimen is referable to *H. insignis*. *H. insignis*, *Pontiosquilla mauiana* (Bigelow, 1931) and *Tetrasquilla mccullochae* (Schmitt, 1940) are the only stomatopod species known from both the Eastern and Indo-West Pacific.

Superfamily SQUILLOIDEA Latreille, 1802

Family SQUILLIDAE Latreille, 1802

Genus *Alima* Leach, 1817

Alima hieroglyphica (Kemp, 1911)

Squilla hieroglyphica Kemp, 1911: 96; 1913: 51, pl. 3, figs 38-41. Type locality: coast of India.

MATERIAL EXAMINED. — Nuku Hiva, stn DW1184, 8°49.3'S, 140°03.6'W, 23-30 m, 26.VIII.1997, 1 ♂ tl 28 (MNHN). — Stn CP1187, 8°49.2'S, 140°03.5'W, 25-30 m, 26.VIII.1997, 1 ♀ tl 27 (MNHN). — Hiva Oa, stn DW1213, 9°50.3'S, 140°03.2'W, 18-20 m, 29.VIII.1997, 3 ♀ ♀ tl 29-30, 1 broken cl 5.8 (MNHN). — Ua Huka, stn 24, Haahue Bay, NW coast, 8°53.60'S, 139°37.00'W, fine sand with some silt, 9-15 m, X.1997, 3 ♂ ♂ postlarvae tl 18-19, 5 ♀ ♀ postlarvae tl 18-19 (MNHN). — Stn 32, Hiniaehi Bay, S coast Ua Huka, 8°56.10'S, 139°32.70'W, fine sand, gravel and algae, 12-17 m, X.1997, 1 ♀ tl 25, 1 ♂ postlarva tl 18, 2 ♀ ♀ postlarvae tl 18 (MNHN).

MEASUREMENTS. — Male (n = 5) tl 18-28, female (n = 9) tl 18-30, male postlarvae (n = 4) tl 18-19, female postlarvae (n = 7) tl 18-19.

DISTRIBUTION. — Indo-West Pacific from India to French Polynesia. A new record for the Marquesas.

REMARKS

Manning (1969) regarded *A. hieroglyphica*, described from India, as a senior synonym of the western Atlantic *A. hildebrandi* (Schmitt, 1940) and the eastern Atlantic *A. labadiensis* (Ingle, 1960). Ahyong (2001), however, showed that the Pacific and Atlantic forms are distinct and recog-

nised *A. hieroglyphica* for the Pacific form and *A. hildebrandi* for the Atlantic form.

The specimens agree well with Kemp (1911, 1913). The colour pattern in most specimens in the present series, including postlarvae, is well preserved including the distinctive elongate triangular patch with a transverse proximal bar either side of the median carina of the telson. All specimens bear five teeth on the dactylus of the raptorial claw and abdominal carinae are spined as follows: SM 5-6, 4-6, IM (3)4-6, LT 6, MG (1)2-5. The postlarvae closely resemble adults, differing in bearing relatively larger eyes, lacking anterolateral spines on the carapace and bearing fewer spines on the lateral and marginal carinae on the abdomen.

Alima neptuni (Linnaeus, 1768)

Cancer neptuni Linnaeus, 1768: 45. Type locality: Bimini, Bahamas, by neotype designation (Holthuis 2000).

Alima neptuni – Manning & Lewinsohn 1986: 13.

Alima hyalina Leach in Tuckey, 1817: unnumbered plate in appendix IV to Tuckey (Cape Verde Islands, 07°37'00"N, 17°34'15"W).

Squilla alba Bigelow, 1893: 103. Type locality: Bimini, Bahamas.

Alima alba – Poupin 1998: 37.

MATERIAL EXAMINED. — Ua Huka, stn 24, Haahue Bay, NW coast, Ua Huka, 8°53.60'S, 139°37.00'W, fine sand with some silt, 9-15 m, X.1997, 1 ♂ postlarva tl 19 (MNHN). — Hiva Oa, stn CP1195, 9°02.5'S, 139°58'W, 800 m, 27.VIII.1997, 1 ♀ final pelagic larva tl 40 (MNHN).

MEASUREMENTS. — Male postlarva (n = 1) tl 19 mm, female final pelagic larva (n = 1) tl 40.

DISTRIBUTION. — All tropical oceans except the eastern Pacific. The present record is new for the Marquesas.

REMARKS

The postlarva and pelagic larva agree well with the accounts of Manning (1962) (as *Squilla alba*). The postlarva differs from Manning's (1962) account only in bearing more intermediate denticles on the telson (13-15) and six instead of five movable spines on the outer margin of the proximal segment of the uropodal exopod.

Genus *Neoanchisquilla* Moosa, 1991

Neoanchisquilla tuberculata Ahyong, 1998 (Fig. 8)

Neoanchisquilla tuberculata Ahyong, 1998: 219, 224, 225, fig. 4. Type locality: Comoro Islands, 12°11'09"S, 44°19'03"E.

MATERIAL EXAMINED. — Nuku Hiva, stn CP1175, 8°45.0'S, 140°16.1'W, 300 m, 25.VIII.1997, 2 ♂♂ postlarvae tl 31-32 (MNHN). — Stn CP1188, 8°48.6'S, 140°03.4'W, 35-55 m, 26.VIII.1997, 1 ♂ tl 56 (MNHN). — Hiva Oa, stn CP1195, 9°02.5'S, 139°58'W, 800 m, 27.VIII.1997, 1 ♀ late pelagic larva tl 32 (MNHN). — Stn DW1209, 9°50.2'S, 139°02.5'W, 85 m, 29.VIII.1997, 1 ♂ postlarva tl 30 (MNHN). — Stn DW1210, 9°50.4'S, 139°00.5'W, 98-100 m, 29.VIII.1997, 1 ♀ tl 35 (MNHN). — Stn DW1211, 9°50.2'S, 139°02.5'W, 50 m, 29.VIII.1997, 1 ♂ broken telson length 7.2, 1 ♀ postlarva broken telson length 6.4 (MNHN). — Stn CP1212, 9°49.9'S, 139°02.2'W, 50-80 m, 29.VIII.1997, 1 ♂ tl 37, 1 ♀ tl 37, 2 ♂♂ postlarvae tl 32, 1 ♀ postlarva tl 32 (MNHN). — Stn CP1228, 9°44.6'S, 138°51.5'W, 107-108 m, 30.VIII.1997, 1 ♂ tl 64 (MNHN). — Stn CP1237, 9°41.9'S, 139°03.6'W, 95-305 m, 31.VIII.1997, 1 ♂ tl 36, 1 ♀ postlarva tl 32 (MNHN). — Fatu Hiva, stn DW1242, 10°28.1'S, 138°41.1'W, 119-122 m, 01.IX.1997, 1 ♂ postlarva tl 32 (MNHN). — Between Society Islands and Marquesas, RV *Alis*, pelagic trawl, 1997, A. Danigo coll., 4 ♂♂ postlarvae tl 30-33, 1 ♀ postlarva tl 32, 1 ♂ late pelagic larva tl > 34 (rostral spine broken), 2 ♀♀ late pelagic larvae tl > 34 (rostral spine broken) (MNHN).

MEASUREMENTS. — Male (n = 5) tl 36-64, female (n = 2) tl 35-37, male postlarva (n = 10) tl 30-32, female postlarva (n = 4) tl 32, male late pelagic larva (n = 1) tl 34+, female late pelagic larva (n = 3) tl 32-34+.

DISTRIBUTION. — Known only from the Comoro Islands and now the Marquesas. The remarkably discontinuous distribution likely reflects inadequate sampling effort in intermediate localities.

REMARKS

Neoanchisquilla tuberculata was previously known only from the holotype. The present series of *N. tuberculata* is significant for including specimens of late pelagic larvae through to adults, unknown or only partially known for most stomatopod species. Selected meristic and morphometric measurements are summarised in Table 1. The last pelagic larva (Fig. 8A, B) is relatively

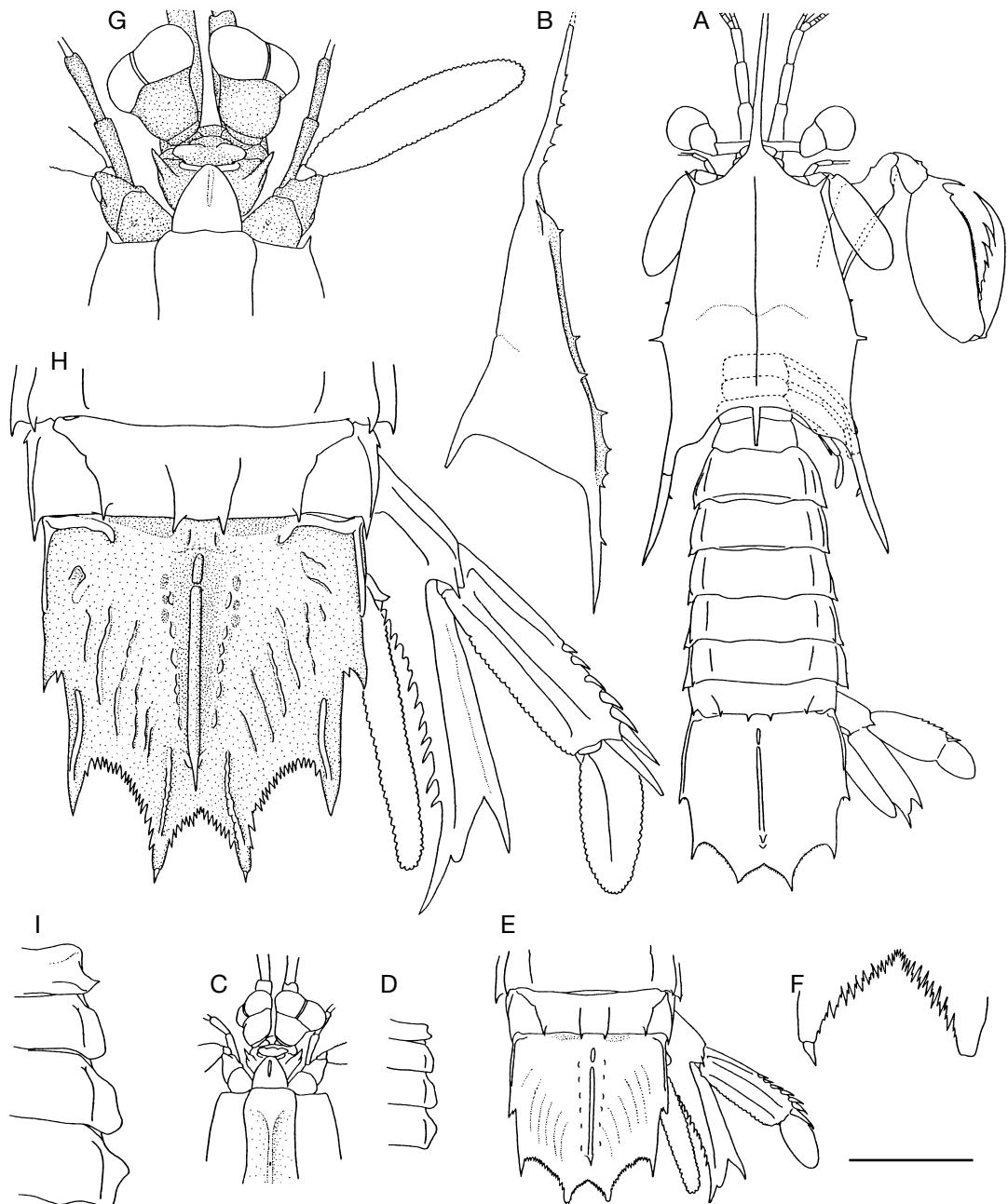


FIG. 8. — *Neoanchisquilla tuberculata* Ahyong, 1998; **A, B**, ♀ late pelagic larva tl 32 mm (stn CP1195); **A**, dorsal; **B**, carapace, right lateral; **C-F**, ♂ postlarva tl 31 mm (between Society Islands and Marquesas); **C**, anterior cephalon, dorsal; **D**, TS5-8, right dorsal; **E**, AS5-6, telson and uropod, dorsal; **F**, submedian telson teeth; **G-I**, ♀ juvenile tl 35 mm (stn DW1210); **G**, anterior cephalon, dorsal; **H**, TS5-8, right dorsal; **I**, AS5-6, telson and uropod, dorsal. Scale bar: A-E, 4 mm; F-I, 2 mm.

TABLE 1. — Selected meristic and morphometric measurements for *Neoanchisquilla tuberculata* Ahyong, 1998. Total length (tl) for late pelagic larvae could not be measured precisely because of broken rostra in several specimens. Relative lengths of the proximal uropodal exopod segment is given by dividing the lengths of the proximal (p) and distal segments (d). Abbreviations: CI, corneal index; cl, carapace length; IM, intermediate; LT, lateral; MG, marginal; n, number; SM, submedian.

	n	tl (mm)	cl (mm)	CI	Mandibular palp (segments)	Uropod p/d	Abdominal spination (SM, IM, LT, MG)
Late pelagic larva	4	34+			1-2	1.77-1.92	6, 6, (4)5-6, 1-5
Post-larvae	14	30-32	6.4-7.1	343-373	2-3	1.55-1.75	6, 6, 2-6, 1-5
Juveniles	5	35-37	7.3-8.5	356-390	3	1.44-1.51	6, 6, (1)2-6, 1-5
Adults	2	56-64	11.5-12.8	434	3	1.17-1.20	6, 6, 1-6, 1-5
Holotype	1	74	16.8	480	3	1.02	6, 6, 2-6, 1-5

large, exceeding tl 34, and bears well developed raptorial claws, fully articulated uropodal exopod segments, fixed submedian teeth on the telson, some abdominal spines and the carapace is obtusely angled along the midline producing a V-shaped cross-section. Postlarvae (Fig. 8C-E) apparently settle at tl 30-32 and lack anterolateral spines on the carapace, bear the median crest on the carapace and a distinct rostral carina, seven teeth on dactylus of the raptorial claw, an undeveloped lateral process on TS5, fewer armed lateral abdominal carinae than adults, movable submedian telson teeth, additional spinules on the margins of the submedian telson denticles, no prelateral lobe or dorsal or ventral telson ornamentation except for the dorsal median carina. Both late pelagic larvae and postlarvae (excepting one postlarva) are pigmented only on maxillipeds 3-5 whereas all stages beyond postlarva have "adult" coloration. These differences in coloration are unlikely to be an artefact of preservation because pigmented juveniles and unpigmented postlarvae were often taken in the same sample.

A notable feature of postlarval *N. tuberculata* is that the cornea is already distinctly bilobed, unlike its congeners, *N. australiensis* Ahyong, 1998, and *N. semblatae* Moosa, 1991. In juvenile *N. tuberculata* (Fig. 8F-H), a distinct rostral carina is present, the TS5 lateral process is present as a ventrolaterally directed spine, the lateral processes of TS6-7 are subtruncate to sinuous as in adults, the prelateral lobe of the telson is distinct and the dorsal ornamentation of the telson is evident: the accessory median carina is tuberculate and the dorsolateral

carinae are irregular, becoming tuberculate; ventrally, only the post-anal carina is present. The relative length of the telson and the proximal segment of the uropodal exopod decreases with size – they are longest in late pelagic larvae and post larvae, shortest in adults.

The two largest specimens bear well-developed penes and petasma, and agree well with the holotype including preserved colour pattern. Apparently, the tuberculate dorsal and ventral ornamentation of the telson is not fully expressed until relatively late in development because only in these two largest specimens are the ventral tubercles on the telson developed. The present adults are both smaller than the holotype and differ in bearing a faint trace of the rostral carina (in the smaller), armed lateral carinae on AS1, and the telson and proximal segment of the uropodal exopod are proportionately longer. These differences are likely to be size related.

Juvenile *N. tuberculata* do not bear fully tuberculate dorsolateral carinae on the telson, but the tuberculate accessory median carina on the telson and rostral carina will prevent confusion of *N. tuberculata* with *N. australiensis* or *N. semblatae*, both of which lack a rostral carina, bear entire dorsolateral carinae and lack the accessory median carina on the telson. Moreover, the dorsolateral carinae of the telson in both *N. australiensis* and *N. semblatae* are sharp and distinct, whereas in juvenile *N. tuberculata*, they are low and blunt.

The large size of the late pelagic and post-larva is unusual in the genus, for both other species mature at a considerably smaller size than postlar-

val *N. tuberculata*. As with Reaka & Manning (1987b), it is tempting to speculate that the large larval and postlarval size (and presumably long pelagic larval cycle) indicates strong dispersal ability, explaining the wide distribution of *N. tuberculata*.

Genus *Oratosquilla* Manning, 1968

Oratosquilla fabricii (Holthuis, 1941) (Fig. 9)

Squilla fabricii Holthuis, 1941: 249-253, fig. 1. Type locality: Telok Dalam, Eil Nias, Indonesia.

Squilla columnnia Townsley, 1953: 410, figs 8, 9. Type locality: Hawaii.

Squilla oratoria — Townsley 1953: 404, figs 2, 3 [non *Squilla oratoria* de Haan, 1844].

Oratosquilla columnnia — Manning 1971b: 4-6, fig. 1. — Moosa 1991: 210, 211. — Ahyong & Norrington 1997: 107. — Poupin 1998: 37.

Oratosquilla mauritiana — Garcia 1981: 24-26 [non *O. mauritiana* (Kemp, 1913)].

Busquilla quadraticauda — Poupin 1998: 37 [non *B. quadraticauda* (Fukuda, 1911)].

Oratosquilla fabricii — Ahyong 2000: 926-930, fig. 1.

MATERIAL EXAMINED. — Eiao, stn CP1156, 7°59.0'S, 140°43.7'W, 80 m, 23.VIII.1997, 1 ♀ juvenile broken cl 6.5 (MNHN). — Stn CP1158, 7°58.7'S, 140°43.9'W, 109-110 m, 23.VIII.1997, AS5-6 and telson (length 28 mm) (MNHN). — Stn DW1266, 7°57.3'S, 140°42.6'W, 84 m, 04.IX.1997, 1 ♀ juvenile tl 33 (MNHN). — Stn DW1279, 7°59.4'S, 140°42.2'E, 23-70 m, 06.IX.1997, 1 ♂ tl 54, 2 ♀ ♀ tl 27, 1 sex indet. (anterior cephalon only, cl < 20) (MNHN). — Nuku Hiva, stn DW1184, 8°49.3'S, 140°03.6'W, 23-30 m, 26.VIII.1997, 2 ♂ ♂ tl 48, 1 broken tl > 19 (MNHN). — Stn DW1185, 8°48.9'S, 140°03.4'W, 31-33 m, 26.VIII.1997, 1 ♀ juvenile tl 41 (MNHN). — Stn DW1186, 8°48.1'S, 140°03.5'W, 42-45 m, 26.VIII.1997, 1 ♀ broken cl 9.3 (MNHN). — Stn CP1187, 8°49.2'S, 140°03.5'W, 25-30 m, 26.VIII.1997, 2 ♂ ♂ tl 37-63 (MNHN). — Stn CP1188, 8°48.6'S, 140°03.4'W, 35-55 m, 26.VIII.1997, 1 ♀ tl 35 (MNHN). — Stn DW1211, 9°50.2'S, 139°02.5'W, 50 m, 29.VIII.1997, 1 ♂ tl 55 (MNHN). — Hiva Oa, stn CP1212, 9°49.9'S, 139°02.2'W, 50-80 m, 29.VIII.1997, 2 ♂ ♂ tl 29-47 (MNHN). — Stn

DW1214, 9°49.8'S, 140°03.1'W, 25-40 m, 29.VIII.1997, 1 ♂ tl 40, 1 ♀ juvenile tl 30, 1 ♀ postlarva tl 28 (MNHN). — Stn DW1224, 9°44.6'S, 138°51.1'W, 115-120 m, 30.VIII.1997, 1 ♂ tl 28 (MNHN). — Stn DW1225, 9°45.2'S, 138°52.6'W, 42-70 m, 30.VIII.1997, 3 ♀ ♀ postlarvae tl 26-27, 5 ♂ ♂ postlarvae tl 27-28 (MNHN). — Stn CP1226, 9°45.3'S, 138°52.6'W, 38-77 m, 30.VIII.1997, 2 ♂ ♂ postlarvae tl 27-28, 1 ♀ postlarva tl 29 (MNHN). — Stn CP1228, 9°44.6'S, 138°51.5'W, 107-108 m, 30.VIII.1997, 2 ♀ ♀ tl 28-41 (MNHN). — Fatu Hiva, stn DW1241, 10°27.8'S, 138°40.6'W, 85-130 m, 01.IX.1997, 1 ♀ postlarva tl 27 (MNHN). — Stn DR1245, 10°29.2'S, 138°36.2'W, 85-130 m, 01.IX.1997, 1 ♂ postlarva tl 24 (MNHN).

MEASUREMENTS. — Male (n = 16) tl 24-63, female (n = 18) tl 27-41, 1 sex indet. cl < 20, male postlarvae (n = 8) tl 24-28, female postlarvae (n = 6) tl 26-29.

DISTRIBUTION. — Widely distributed in the central and western Pacific from the Philippines, New Caledonia, Guam, Fiji, Hawaii, Tahiti and the Marquesas.

REMARKS

The present series of specimens provides strong support for Manning's (1971b) association of the juvenile holotype of *Squilla columnnia* Townsley, 1953, with adults from Hawaii (all as *O. columnnia*). As mentioned by Manning (1971b), characters diagnostic for adults are often undeveloped in postlarvae and juveniles. Townsley's (1953) account of the holotype of *S. columnnia* agrees well with the postlarvae reported below. Ahyong (2000) showed that *O. columnnia* is a junior synonym of *O. fabricii*. In the present material, postlarvae show reduced carinae and lack antero-lateral spines on the carapace, the rostral plate bears a median carina, the lateral processes of TS5-7 are indistinctly bilobed, fewer carinae on the abdominal somites are armed, the tubercles on the dorsal carina on the carpus of the raptorial claw are undeveloped as is the tooth on the outer margin of the merus of the raptorial claw. In most of these characters, particularly in the morphology of the TS5-7 lateral processes, postlarval *O. fabricii* resemble adults of *Busquilla* Manning, 1978; the specimen from Tahiti reported by Poupin (1998) as *B. quadraticauda* (MNHN Sto 1961) is a juvenile of *O. fabricii*. By approximate-

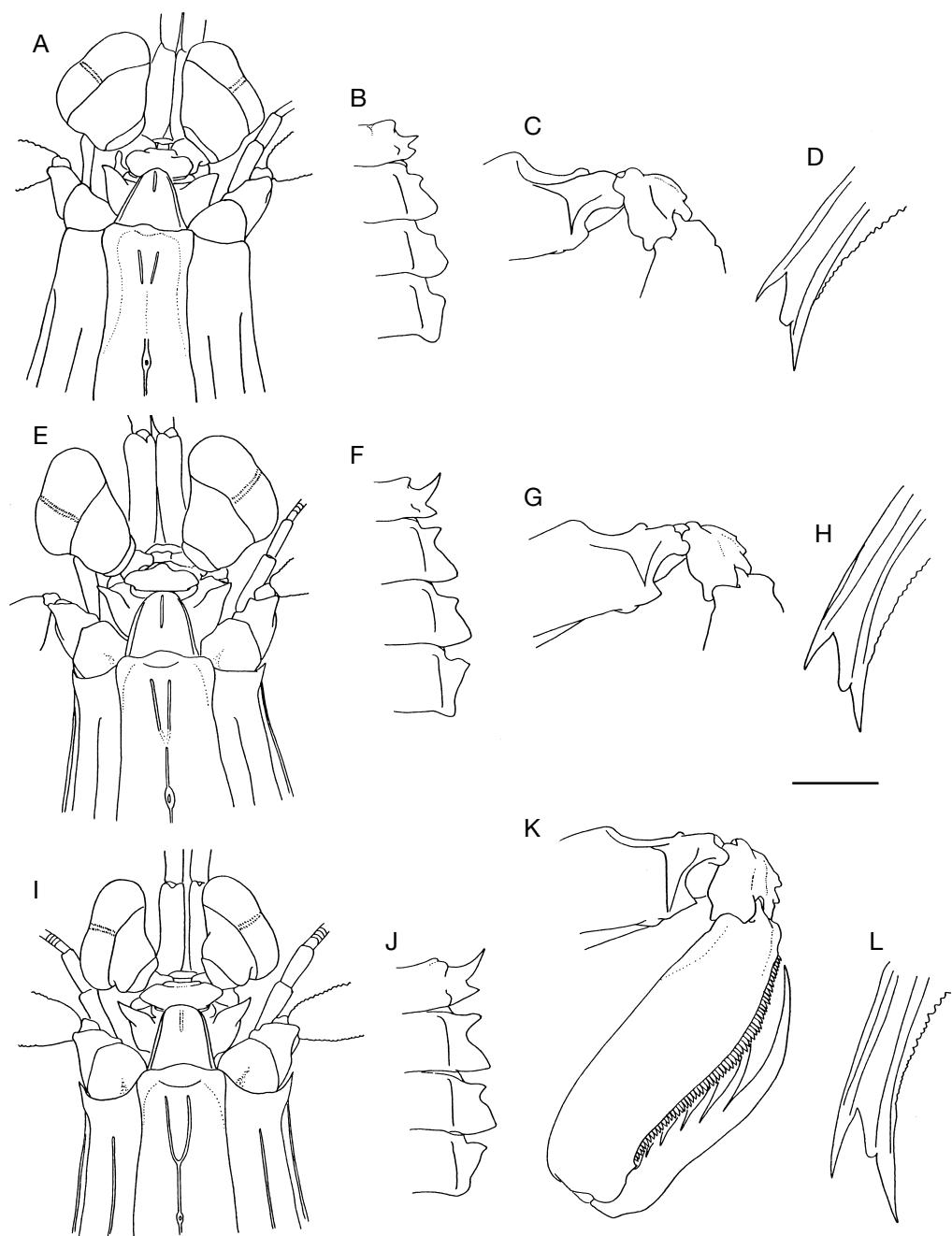


FIG. 9. — *Oratosquilla fabricii* (Holthuis, 1941); A-D, ♀ postlarva tl 29 mm (stn DW1241); A, anterior cephalon; B, TS5-8, right dorsal; C, raptorial claw carpus, right lateral; D, uropodal protopod, right ventral; E-H, ♀ juvenile tl 30 mm (stn DW1214); E, anterior cephalon; F, TS5-8, right dorsal; G, raptorial claw carpus, right lateral; H, uropodal protopod, right ventral; I-L, ♂ tl 63 mm (stn CP1187); I, anterior cephalon; J, TS5-8, right dorsal; K, raptorial claw, right lateral; L, uropodal protopod, right ventral. Scale bar: A-H, 1.5 mm; I-L, 3 mm.

ly tl 35, anterolateral spines on the carapace are well developed, the anterior bifurcation of the median carina on the carapace is usually interrupted, the carpus on the raptorial claw is irregular, the inferodistal margin on the merus of the raptorial claw is angular, the lobes on lateral processes of TS5-7 are better defined and the abdominal carinae are spined as follows: SM 5-6, IM 3-6, LT 2-6, MG 1-5. By tl 48, submedian carinae of AS4 are armed posteriorly. Adult diagnostic characters are not shown until the tl exceeds 55 mm in which the median carina on the rostral plate more closely resembles a low tubercle, the median carina of the carapace is entire at the base of the anterior bifurcation, the carpus of the raptorial claw is distinctly tuberculate and the inferodistal angle is produced to a blunt tooth, the anterior lobes of the lateral processes of TS6-7 relatively slender, the penes are well developed and the abdominal spination is SM 4-6, IM (1)2-6, LT 1-6, MG 1-5.

Unfortunately, because diagnostic characters of adult *O. fabricii* do not develop until a relatively large size (tl > 55), the "slow" development of the anterior bifurcation of the carapace and submedian spines of AS4 could confound specific as well as generic assignment. The single distinguishing character between *Oratosquilla* Manning, 1968, and *Oratosquillina* Manning, 1995 is the condition of the anterior bifurcation of the median carina of the carapace, whether uninterrupted or interrupted basally. Moreover, many stomatopod species show adult characters at a considerably smaller size than *O. fabricii*. Therefore, the degree of development of the male penes and modified pleopod 1 endopod should be considered (as a surrogate for sexual maturity), particularly when identifying small specimens. Juveniles shorter than tl 55 could easily be confused with juvenile *Oratosquillina asiatica* (Manning 1978) because of the presence of the rostral carina, interrupted median carina of the carapace, irregular or tuberculate carpal carina of the raptorial claw and armed submedian carinae of AS4 in some specimens. The preserved colour pattern of the two species is similar, but in *O. fabricii* the distal segment of the uropodal exopod is dark on

the inner half and the anterior lobe of the lateral process of TS7 is a large conspicuous lobe, whereas in *Oratosquillina asiatica*, the distal segment is dark only on its inner proximal third or quarter and the anterior lobe of the lateral process of TS7 is present as a small point.

It is noteworthy that several of the juvenile characters of *Oratosquilla fabricii* are retained by adults of *Quollastria* Ahyong, 2001, and *Oratosquillina* Manning, 1995. Hence, species of *Oratosquillina* and *Quollastria* bear the interrupted anterior bifurcation of the median carina of the carapace and an uninterrupted dorsal carpal carina of the raptorial claw (in most species of *Oratosquillina*) suggesting retention of paedomorphic characters in adults of the two genera. As noted by Ahyong (2001), adults of *Busquilla* retain many features of postlarval or juvenile *Oratosquilla*. The role of heterochrony in the radiation of the stomatopods warrants further study.

DISCUSSION

The species represented in the present collection probably form part of a stomatopod fauna that can be expected to occur throughout French Polynesia. Poupin's (1998) annotated checklist of Decapoda and Stomatopoda from French Polynesia includes 26 stomatopod species. As noted above, the record of *Busquilla quadraticauda* from Tahiti is based on a juvenile of *Oratosquilla fabricii*. Three additional species reported in the literature were not included by Poupin (1998) – *Chorisquilla tuberculata* (Borradaile, 1907), *Gonodactylellus affinis* (De Man, 1902) and *Gonodactylus smithii* (Pocock, 1893). The records of *Gonodactylinus viridis* (Serène, 1954) from French Polynesia summarised by Poupin (1998) are regarded here as misidentifications of a superficially similar species *Gonodactylus childi* Manning, 1971, which is abundant in French Polynesia (R. L. Caldwell pers. comm.). *Chorisquilla excavata* (Miers, 1880) was recorded from French Polynesia by Barber & Erdmann (2000) and Ahyong (2001). *Gonodactylellus erdmanni* Ahyong, 2001 was

reported from French Polynesia by Ahyong (2001). Allowing for these modifications to Poupin's (1998) list, the present study shows that at least 37 stomatopod species occur in French Polynesia of which 19 are now known from the Marquesas. Of the 14 species reported above, nine are new to the Marquesas and seven are new to French Polynesia. The present study therefore increases the number of known species from French Polynesia by 25%. The large increase in the known stomatopod fauna of the region, based on this small collection, suggests that more intense sampling from other island groups in the region and from different habitats will yield many more species.

The stomatopod fauna of French Polynesia is dominated by representatives of the superfamilies Gonodactyoidea and Lysiosquilloidea that dominate coral reef and offshore habitats. The relatively few squilloids may owe to the paucity of suitable habitats, since squilloids favour sandy-mud substrates along continental margins. Most stomatopods from French Polynesia are widely distributed in the Indo-West Pacific, but the two new species *Acanthosquilla crosnieri* n. sp. and *Gonodactyoideus tricarinatus* n. sp. are presently known only from the Marquesas. The following checklist of species from French Polynesia is based on published accounts and includes their respective distributions in the region. Citations of stomatopods from French Polynesia included by Poupin (1998) are not repeated below. Therefore, in addition to Poupin (1998), only new references, those omitted by Poupin, and present records are cited below. Species known from the Marquesas are marked in bold; new records for the Marquesas (*); new records for French Polynesia (**).

STOMATOPODA KNOWN FROM FRENCH POLYNESIA

Superfamily BATHYSQUILLOIDEA Manning, 1967
Family BATHYSQUILLIDAE Manning, 1967

Bathysquilla microps (Manning, 1961)**: Eiao Island, Marquesas (present record).

Family INDOSQUILLIDAE Manning, 1995

Indosquilla manihinei Ingle & Merrett, 1971:
Fangataufa, Tuamotu (Poupin 1998).

Superfamily LYSIOSQUILLOIDEA Giesbrecht, 1910
Family LYSIOSQUILLIDAE Giesbrecht, 1910

Lysiosquillina maculata (Fabricius, 1793):
Tahiti, Raiatea and Bora Bora, Society Islands;
Tuamotu; Nuku Hiva and Eiao Islands,
Marquesas (present record; Poupin 1998).

Lysiosquillina sulcata (Manning, 1978): Moorea,
Society Islands (Poupin 1998).

Family NANNOSQUILLIDAE Manning, 1980

Acanthosquilla crosnieri n. sp.**: Hiva Oa and
Ua Huka, Marquesas (present record).

Pullosquilla litoralis (Michel & Manning, 1971):
Tiahura and Moorea, Society Islands; Nuka
Hiva, Marquesas Islands (Poupin 1998).

Pullosquilla thomassini Manning, 1978:
Tiahura and Moorea, Society Islands (Poupin
1998).

Family TETRASQUILLIDAE Manning & Camp, 1993

Heterosquilloides insignis (Kemp, 1911)**: Ua
Pou, Marquesas (present record).

Superfamily GONODACTYLOIDEA
Giesbrecht, 1910

Family GONODACTYLIDAE Giesbrecht, 1910

Gonodactylellus affinis (De Man, 1902): Society
Islands (Gosliner *et al.* 1996).

Gonodactylellus erdmanni Ahyong, 2001:
Moorea, French Polynesia (Ahyong 2001).

Gonodactylellus espinosus (Manning, 1967):
Fakarava Island, Tuamotu; Bora Bora, Mataiva,

Moorea, Society Islands; Ua Huka, Nuku Hiva, Fatu Hiva, Marquesas (present records; Poupin 1998).

Gonodactylellus incipiens (Lanchester, 1903): Moorea, Tahiti, Society Islands, Fakarava Island, Tuamotu (Poupin 1998).

Gonodactylellus micronesicus (Manning, 1971)**: Hiva Oa, Ua Pou and Ua Huka, Marquesas (present record).

Gonodactyloides tricarinatus n. sp.**: Eiao Island, Marquesas (present record).

Gonodactylus childi Manning, 1971: Moorea (Poupin 1998).

Gonodactylus chiragra (Fabricius, 1787): Ohura-Hao, Kaukura Atoll, Fakahina lagoon, Tuamotu; Society Islands and Marquesas (Poupin 1998).

Gonodactylus platysoma Wood-Mason, 1895: Ngarumaoa Island, Raroia Atoll, Tuamotu; Bora Bora, Raiatea, Society Islands; Marquesas (Poupin 1998).

Gonodactylus smithii Pocock, 1893: Society Islands (Gosliner *et al.* 1996).

Gonodactylaceus randalli (Manning, 1978): Moorea, Society Islands (Poupin 1998).

Gonodactylaceus falcatus (Forskål, 1775): Moorea (Poupin 1998).

Family ODONTODACTYLIDAE Manning, 1980

Odontodactylus brevirostris (Miers, 1884): Nuku Hiva, Ua Huka and Hiva Oa, Fatu Hiva, Marquesas (present record; Poupin 1998).

Family PROTOSQUILLIDAE Manning, 1980

Chorisquilla excavata (Miers, 1880): Moorea, Society Islands (Barber & Erdmann 2000).

Chorisquilla tuberculata (Borradaile, 1907): Marquesas (Michel & Manning 1972).

Echinosquilla guerini (White, 1861): Marquesas (Poupin 1998).

Family PSEUDOSQUILLIDAE Manning, 1977

Pseudosquilla ciliata (Fabricius, 1787): Mangareva, Gambier Islands, Tuamotu; Hiva Oa and Nuku Hiva, Marquesas (present records; Poupin 1998).

Pseudosquillana richeri (Moosa, 1991): Huahine, Tahiti, Society Islands; Fakarava, Tuamotu (Ahyong *et al.* 2000).

Pseudosquillisma oculata (Brullé, 1837): Tahiti, Society Islands (Odhner 1923; Poupin 1998).

Raoulserenea hieroglyphica (Manning, 1972): Tahiti, Society Islands (Poupin 1998); Mataiva, Tuamotu (Caldwell & Manning 2000, as *Raoulserenea pygmaea* Caldwell & Manning, 2000).

Raoulserenea komaii (Moosa, 1991)*: Moorea, Society Islands (Debelius 1999); Marquesas (present record).

Raoulserenea ornata (Miers, 1880): Moorea, Tahiti, Society Islands (Poupin 1998).

Family TAKUIDAE Manning, 1995

Mesacturus furcicaudatus (Miers, 1880): Matakeia, NE of Tahiti, Society Islands (Poupin 1998).

Superfamily SQUILLOIDEA Latreille, 1802

Family SQUILLIDAE Latreille, 1802

Alima hieroglyphica (Kemp, 1911)*: Hiva Oa, Ua Huka and Nuku Huva, Marquesas (present record).

Alima neptuni (Linnaeus, 1768)*: Moorea, Society Islands (Poupin 1998); Ua Huka, Marquesas (present record).

Miyakea nepa (Latreille, 1828): Tahiti (Poupin 1998).

Neoanchisquilla tuberculata Ahyong, 1998**: Nuku Hiva, Hiva Oa and Fatu Hiva, Marquesas (present records).

Oratosquilla fabricii (Holthuis, 1941): Tahiti; Eiao, Nuku Hiva, Hiva Oa and Fatu Hiva, Marquesas (present records; Poupin 1998, as *Busquilla quadraticauda*).

Parvisquilla multituberculata (Borradaile, 1898): Moorea, Society Islands (Poupin 1998).

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